

Chapter 13



Working with Students with Basic Skills Needs In Career and Technical Education (CTE): Completing the Building Part I

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If you are a CTE instructor, you will not be surprised to hear that more and more students with basic skills needs are entering Career and Technical Educational programs. You've probably seen increasing numbers of bright and eager students who sit in your classes, anxious to embark on a higher wage career, yet who lack the necessary preparedness in mathematics, writing or English as a second language (ESL). Like transfer faculty, you're puzzled with how to deal with the 70-85% of students who assess into some sort of basic skills class when they enter your college (Center for Student Success, 2007). Perhaps you're aware that less than 10% of students who enter basic skills classes and start three or more levels below ever reach college-level (Illowsky, 2008). No wonder many of these students enroll in CTE programs, but they lack the basic skills they need to persevere and succeed. You've heard these students' stories and know just how much it will mean to them to get training in an occupational field, to construct a building to house their career dreams. But what can you do to assist these students to develop the skills that they lack, to erect a sound structure, all the while teaching them the intricacies of your program?

Don't despair! This chapter will focus on some innovative approaches that contextualize the teaching of basic skills within a chosen CTE career path, helping students to properly frame any career structure they choose to build. There are promising examples from the states of Arkansas, Colorado, Illinois, Ohio, and Washington as well as new and exciting programs in California that have successfully addressed students with basic skills needs while training them for higher wage earning careers.

But first, let's look at some of the common perceptions about students with basic skills needs who enroll in CTE classes and programs. You probably know the answers to these questions already, but you may find these questions a good way to educate fellow faculty about the situation you are facing. Test their CTE IQ. Mark your answers to the questions below.



True or False?

1. Students don't need reading or mathematics to be successful in CTE programs, because they need very discrete skills for specific occupational roles.
2. The majority of students who get their GED continue on to higher levels of education and/or occupational training.
3. The only way CTE students with basic skills needs can improve those skills is to enroll in a basic skills course.

Clearing up a Few Common Misconceptions

The next part of this chapter has been designed around answering the mini-quiz. How many of your fellow transfer or basic skills faculty would have answered the questions correctly?

1. **Students don't need reading or mathematics to be successful in CTE programs because they need very discrete skills for specific occupational roles.**

False. Most employers require employees to speak English, do simple arithmetic and read well enough to follow directions. SCANS (The Secretary's Commission on Achieving Necessary Skills) requirements for career readiness include tasks likely to be performed in a number of different career paths:

Quality control inspectors need to: chart inspection due dates; estimate the time needed to conduct an inspection; generate a schedule of inspections that make the best use of time and space.

Chefs need to: allocate money to purchase food products; assess or project customer demand for the product; estimate costs such as labor and ingredients and be able to use a computer spreadsheet.

Travel agents need to: identify client needs and collect relevant materials; plan for storage and space needed for materials; take an inventory of materials and acquire additional materials as needed.

Assistant housekeepers need to: forecast staffing needs; conduct performance appraisals; create staffing plans.

More on SCANS Skills

Here's more evidence about why another approach is necessary. The 1991 Secretary's Commission on Achieving Necessary Skills (SCANS) report identified basic competencies and foundation skill sets which are necessary for students' eventual success in the world of work. See Appendix 1 for the Scans Skills Summary. The Commission, appointed by the Secretary of Labor, "believes that teachers and schools must begin early to help students see the relationships between what they study and its application in real-world contexts." (SCANS, 1991, p. 16) It also asserts that after examining the findings of cognitive science, the most effective way of teaching skills is **in context**. Most importantly, the Commission emphasizes that SCANS skills are not just for career or vocational programs but should be incorporated across all disciplines. SCANS are not just for CTE faculty to embrace. The Commission predicts that when everyone in the college does so:

Students will find the content more relevant and challenging. Teachers will find their classes more attentive and interested. Employers and college officials will be delighted with the results because the curriculum will be tied to real things in the real world. (SCANS, 1991, p. 18)

Let's take a look at the workplace know-how identified by SCANS (p. 22):

COMPETENCIES- Effective workers can productively use:

Resources: allocating time, money, materials, space, staff.

Interpersonal Skills: working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds.

Information: acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information.

Systems: understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems.

Technology: selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.

THE FOUNDATION- Competence requires:

Basic Skills: reading, writing, arithmetic and mathematics, speaking and listening.

Thinking Skills: thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning.

Personal Qualities: individual responsibility, self-esteem, sociability, self-management and integrity.

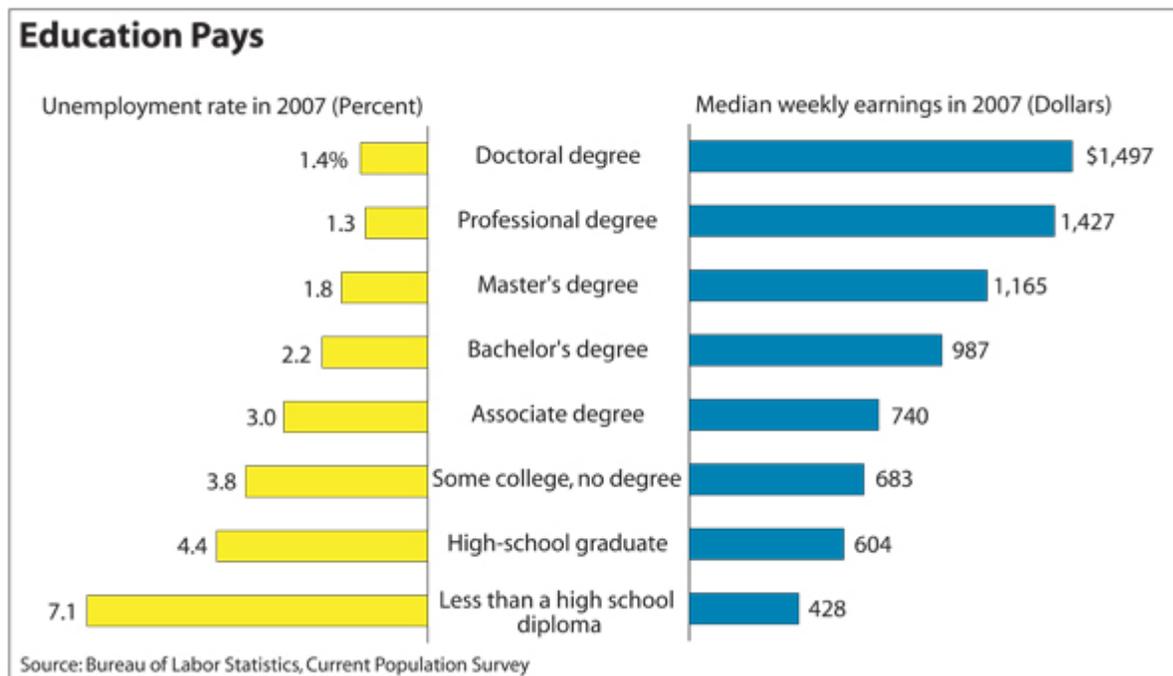
Back to the Quiz

2. The majority of students who get their GED continue on to higher levels of education and/or occupational training.

False. Nationally, only 12% of those who obtained GEDs have attended college for one year in the first decade after earning the GED; 3% earn at least an AA degree. Over the long run, 30% of GED graduates have some postsecondary education but no degree; only 8% have at least a Bachelor degree. Out of 100 adult education students, at best only 20 get GEDs, about 8 go on to postsecondary education and 2 get a Bachelor degree. Very few ESL students achieve a transition. (Strawn, 2008).

While the US Department of Labor Statistics show that each level of education contributes to better earnings and lower unemployment, our challenge is to help students make that connection to a certificate or degree that will help them secure their future and decrease unemployment. Education helps them build the structures that will house a successful life.

Education pays in higher earnings and lower unemployment rates.



Source: Chart data found at <http://www.bls.gov/emp/edupay.txt> Note: Data are 2007 annual averages for persons age 25 and over. Earnings are for full-time wage and salary workers. The Bureau of Labor Statistics, Current Population Survey has some data on the employment status of the civilian non-institutional population 25 years and over by educational attainment, sex, race, and Hispanic origin online. The Bureau of the Census also has some data on the educational attainment online. (Bureau of Labor, 2007).

3. The only way CTE students with basic skills needs can improve those skills is to enroll in a basic skills course.

False. While we have established that these skills are basic for our 21st Century life and work, it is not common practice in CTE pathways in California community colleges to require placement assessment in mathematics, English and reading skills. (Some colleges do require basic skills assessment but many do not.) Part of the reason for not requiring basic skills coursework is that student goals in CTE are heavily focused on immediate occupational skills. Students do not want to spend time in classes that appear, on the surface, to be unrelated to their occupational needs. At times, the drilling and basic skills content can appear to be a poor match for many CTE students' interests and goals, which are typically focused on entering and advancing in careers. Julie Strawn, Senior Fellow, Center for Law and Social Policy, believes that this situation is urgent. In a presentation on *Basic Skills and Workforce Ed. Better Together*, she stated that the one-size-fits-all approach for basic skills programs used by some colleges, with a rigid sequence of required coursework, takes too long for students to move into workforce education. (Strawn, 2008)

Yet ignoring these basic skill needs often translates into an inability to read manuals, do simple mathematics, translate directions into precise meaning, or ultimately pass licensure exams. So how do we address this? The most successful methods in CTE basic skills development lie in three areas:

1. **Learning communities** – which reach across the disciplines to address skills, but address also content within the discipline.
2. **Directed learning activities (DLA)** – which incorporates tutorial centers and activities to address specific basic skills needs.
3. **Contextualized instruction** – which teaches basic skills within the context of a career path (in CTE) or discipline (in transfer courses).



Learning Communities – (contributed by Jan Connal, Cerritos College Faculty and reprinted from Chapter 6 of this Handbook)

In higher education, “learning communities are classes that are linked or clustered during an academic term, often around an interdisciplinary theme, and enroll a common cohort of students. A variety of approaches are used to build these learning communities, with all intended to restructure the students’ time, credit, and learning experiences to build community among students, between students and their teachers, and among faculty members and disciplines” (Learning Communities, 2008, p. 1). Integration between academic content and student development courses taught with a learning community format is especially effective for developmental students, particularly when students are enrolled in these learning communities early on. Both students and faculty work closely together creating a supportive social safety net that serves to bring students who previously functioned on the margins of the educational enterprise into the center of activity, engaging more fully in their learning. Often, these communities serve as a bridge from a previous poor experience with education to one full of hope because students are learning how to learn and learning what it takes to be a college student.

Cabrillo College offers a cohort program called Digital Bridge Academy (DBA) that offers at-risk students a chance to reclaim a positive learning experience through community building in an

integrated learning environment. The program begins with a two-week foundation course that students in their learning and education, and assists in forming the depth of connection students need to withstand their fears of going to school. The two-week foundation course is then followed by a one semester, intensive cohort experience where students examine their previous experiences with education, communication styles, and other personal and interpersonal skills while taking a total of six courses that prepare them for a variety of careers (i.e., Computer Information Systems, Engineering, Business, Management, Allied Health majors, lab technician careers, Criminal Justice, Teaching, and other high-wage or high-demand fields). Each class is completely integrated with common learning objectives with assignments focused on a community-based social justice primary research project. After the DBA semester, students are expected to take a full course load working toward their major, and can opt to participate in further DBA seminars or internships, but they are no longer required to stay together as a cohort. The program has shown a high degree of success in working with disadvantaged students who are not ready for college work. The program is thorough in its efforts to collect outcome data on persistence and completion rates, including demographic components, and evaluations of the program from students, program staff, and an external evaluator. Initial expectations anticipated a high attrition rate with DBA students; however, an external program evaluation found that on average 75% completed the Bridge Semester successfully with a grade of C or better. In addition, this 75% completed the semester with 12+ units (full time). Among those who had taken some college courses before entering the Academy, the mean grade point average improved from 1.61 prior to the Academy experience to 3.02 after. Students reported strong increases in motivation and self-efficacy, and rated the program very high, in many cases calling it “life changing.”

Directed Learning Activities (DLA) – (contributed by Wade Ellis, Emeritus faculty Mission College and reprinted from Chapter 9 of this Handbook)

A Directed Learning Activity (DLA) is a flexible learning tool used by a college to integrate a Tutorial Center into the mathematics (and other discipline) curricula with the added bonus that hours by arrangement can be legitimately collected from the Chancellor’s Office. An instructor decides on a mathematical activity tied to the course curriculum that may:

- review a concept or skill before it is needed in class,
- enhance a student learning skill, or
- build toward proficiency in a specific Student Learning Outcome (SLO).

The instructor constructs the DLA according to well-developed instructional design criteria, provides the Tutorial Center with the written material for the DLA, and the Tutorial Center, in conjunction with the instructor, trains the tutors who will help the students assess their work on the DLA in the Tutorial Center. The course syllabus will require DLAs during the course. Chaffey College has successfully implemented a DLA program in their Mathematics Success Center and integrated this instruction with a variety of CTE programs.

The use of DLAs increases student use of the Tutorial Center for tutoring beyond the DLAs, provides funding for the Tutorial Center, integrates supplemental instruction closely with courses, and can provide a method for increasing student performance on the measurable course SLOs.

DLA Instruction Design Criteria

- The language of the activity clearly connects to the course assignments, objectives, and/or outcomes.
- The tutor and Tutorial Center are an essential component of the activity.
- The classroom instructor's directions guide a significant portion of the activity. The tutor mainly functions to review and enhance the learning experience.
- The activity clearly indicates how the outcome will be further developed through classroom instruction.
- The goal of the activity is the development of skills and strategies rather than the mere completion of exercises.



Contextualized Instruction

The SCANS report pointed out that according to research in neuro- and cognitive-science, the best way to learn something is in context. Evidence is mounting that shows just how well students benefit if their basic skills needs are addressed in the context of their career path. *Contextualized instruction* (also known as *contextual teaching and learning*, *functional context learning*, *customized instruction*, *experiential learning*, *active learning*, *real-world education*, and *learner-centered instruction*), is based on developing new skills, knowledge, abilities, and attitudes in students by presenting subject matter in meaningful and relevant contexts: contexts of previous experience, real-life, or the workplace. New skills are then applied in these relatable contexts. Key words that describe this method are *applied*, *relatable*, *relevant*, and *authentic*. Just like the SCANS skills, this approach works in both career education and in transfer and general education courses. Here we are focusing on its use in CTE.

Are you thinking, “Isn’t this just another name for Applied Learning?” Yes. Contextualized instruction is not new (Weinbaum and Rogers, 1995, p. 12). As early as the 1940s, the armed forces were contextualizing instruction to reflect the everyday life experiences and duties of soldiers (Sticht, 1997). Since the early 1970s, adult educators have been providing and advocating for functional context instruction, focused on teaching to learners’ immediate educational, job, or life-skill needs (Gillespie, 2003).

Contextualized instruction is widely used in community college workplace training programs. Skills are taught in the context of what is required and relevant for the job, like estimating construction materials, writing an incident report, or working effectively on a team. Instruction is also often contextualized in many developmental education (basic skills) programs; skills are taught in the context of what is required and relevant for general life and survival skills, like filling out forms, balancing a checkbook, interviewing for a job, comparison shopping, or writing a note to a child’s teacher. Similarly, in career pathways programs, basic skills are contextualized in relation to a particular industry or career. This method “helps teachers relate their subject matter content to real world situations and motivates students to make connections between knowledge and its applications to their lives as family members, citizens, and workers” (Ohio State University, 1999, ¶2). Research has shown that “teaching academic applications in a career context is an effective way to engage hard-to-reach students and motivates them in the areas of math, written and oral communication, critical thinking skills, and problem solving” (Center for Student Success, 2007, p. 58). Additional student outcomes cited are increased confidence, enthusiasm, interest towards long-term goals, and a willingness to pursue the education required to achieve them (Weinbaum and Rogers, 1995, pp. 13-15).

A statewide initiative in Washington paired English as Second Language (ESL) instructors with professional-technical instructors so that ESL was taught in the context of the job training program. ESL participants in this pilot group earned five times more college credits on average and were 15 times more likely to complete the workforce training than a control group of ESL-only students over the same amount of time. The results were so profound that it prompted a statewide change in full time equivalent (FTE) calculations for funding reimbursement in order to accommodate two instructors in the classroom simultaneously, along with enhanced support services (Washington State Board for Community and Technical Colleges, 2005). Not all CTE programs can obtain increased funding to allow CTE instructors to co-teach with basic skills colleagues; however, by taking advantage of current professional development opportunities, CTE instructors can learn how to incorporate some contextualized basic skills into their courses.

Why Incorporate Contextualized Basic Skills into CTE Courses?

The educational research and practices noted above indicate that contextualized instruction is an effective way to engage at-risk students and that it increases student performance, success, motivation, enthusiasm, interest, and transfer of skills (Washington, 2005; Ohio, 1999; Center, 2007; Paris and Huske, 1998; Weinbaum, 1995; and Gillespie, 2003). At-risk students have a better chance of successfully completing CTE programs which incorporate immediately relevant, contextualized basic skills lessons than they do CTE programs that do not (Washington, 2005). Contextualized instruction is often more successful than traditional models of adult education because it engages students and links them to work (Mazzeo, 2003).

Where Have Contextualized Basic Skills Programs Been Used Successfully, Both Here in California and Nationally?

Building Bridges to Colleges and Careers: Contextualized Basic Skills Programs at Community Colleges is a downloadable document that summarizes model programs from colleges in five states (Mazzeo, 2003), three of which will be summarized here.

At Cabrillo College in Santa Cruz, California, the Early Childhood Education (ECE) program aspired to bring low-income individuals into the field as teachers or as advocates and to advance them along a career path to increasingly higher earnings. Students were mostly women, predominantly Mexican-American, and about a third had reading and writing skills far below ninth grade. The program's goal was to move students along the path toward an associate's degree while at the same time teaching them English. The core ECE curriculum was provided in Spanish in order to get students to the first significant step in the career ladder and the students, who placed along a wide range of English proficiencies, were advised to take whichever Vocational ESL (VESL) course in which they placed. Students continued with the VESL sequence as needed until they mastered "VESL in the world of work" and subsequently, "VESL in Careers with Children." Partnerships with the Adult School and the Regional Occupational Program (ROP) made these ECE-linked VESL classes possible. As students advanced to higher levels in the ECE curriculum, less Spanish and more English was used in the classroom. The contextual English language instruction in the ECE classes focused on "reading to learn." Students were also taught note-taking. The program instructor noted that if they hadn't offered the initial ECE courses in Spanish, "we wouldn't have three-fourths of the enrollment that we have" (Mazzeo, 2003, p.6).

Another example comes out of the Community College of Denver; Denver, Colorado. The college's Essential Skills Program is a nationally recognized welfare-to-work and bridge program that provides entry-level skills training in specific employment "tracks." It includes tracks for Information Technology, Early Childhood Education, Financial Services/Accounting, and Community Health Worker. Students take one month of classes followed by a three-month internship that is combined with 15 hours of class time. All students take core classes in reading, writing, speaking, communications for the workplace, and computer literacy, along with courses specific to their specific track. Students with lower levels of English proficiency are placed in a VESL program not connected to the four tracks. There are extensive support services with a heavy presence of full-time staff. Basic skills instruction, especially reading comprehension, is infused throughout *all* classes and the students' workload is rigorous and demanding. At time of publication, 290 students had enrolled with 219 finishing the program. Nearly 80% of graduates from the first two years were still employed (Mazzeo, 2003, p.14).

Westside Technical Institute (WSTI) at Daley Community College of Chicago, Illinois has a Career Bridge Program which was designed for students who score too low on the Test of Adult Basic Education (TABE) to enter college-level technical training programs at WSTI. Using a "learning communities" (cohort) approach, students complete a ten-week program consisting of an integrated set of courses in reading/employment skills, mathematics, and TABE Test-Taking Strategies, combined with orientations of the program and of the campus. Classes were designed to be engaging and meaningful with such strategies as making employment and career the context for reading instruction, teaching mathematics in a hands-on and applied fashion, and putting native and non-native speakers together. During 2001, 90% of 250 TABE tests taken by students showed improvement and 43% achieved the requisite scores to enroll in one of the college's vocational programs. Of 500 students who enrolled in the Career Bridge Program from 1999 to 2000, nearly three-fifths went on to enroll in one of the college's advanced certificate programs (Mazzeo, 2003, p. 9).

The California Community College Workplace Learning Resource Centers (WpLRCs) have been contextualizing basic skills instruction since their inception in 1992 and routinely provide both model curricula and technical assistance to other California community colleges. A recent example comes out of El Camino Community College District WpLRC in Hawthorne and Oxnard College WpLRC in Oxnard, are both providing contextualized basic skills for the Advanced Transportation Technology and Energy (ATTE) Center's *Heavy Wind-Generation Technician Training*. For the parts of the training that have proved too difficult for low-level learners, the WpLRCs developed relevant, contextual lessons in mathematics and in ESL vocabulary and reading. The WpLRCs also provided an in-service training workshop on the development process for faculty.

Mission College in Santa Clara has developed contextualized training for ESL in the fields of healthcare (an English Pronunciation CD was co-produced with the Regional Health Occupations Resource Centers), environmental service technicians, pharmacy clerks, and landscapers. They have also developed a contextualized mathematics assessment for pipefitters, contextualized Japanese and Mandarin courses, and contextualized leadership and computer training.

Merced College is a regional partner with five colleges and two outreach centers in a Career Advancement Academy grant project that contextualizes CTE job tracks and career ladders with basic workplace skills, student support services, and direct interventions in student career

advancement and job placement. Within this project, Merced College has incorporated contextualized mathematics and English skills into its existing Office Computers in Business curriculum for students enrolled in their 24-week Office Technology program. They cover such topics as goal setting, prioritizing, time management, and preparing an itinerary, as well as topics in English such as identifying parts of speech and writing complete sentences. These students also have the opportunity to enroll in the Merced WpLRC's Customer Service Academy, a ten-module workplace soft skills curriculum available in both private and public sector versions.

What is the Process Used to Develop Contextualized Instruction?

Instructors interested in learning how to contextualize instruction in career and technical education should seek college-sponsored professional development workshops. While just a brief overview, here are some of the steps and considerations involved:

1. Connect with local employers and maintain a continual dialogue with them so that you are clear about which skills will be needed on the job and to what degree. Adjust your course goals and objectives to incorporate the skills and knowledge required.
2. Identify the essential basic skills students will need for success in a particular CTE course: reading, writing, speaking, listening, mathematics, soft skills, computer skills and other technologies, etc. Think of things like career-specific vocabulary, phrases, and language styles; consider creating glossaries, vocabulary exercises, and authentic scenarios for active student practice. Think about incorporating readings and written or verbal instructions followed by comprehension tasks. Consider the key mathematical processes, formulas, or equations, and the incremental skills students must have to solve them. What types of writing tasks, styles or formats are typical, and how can those be learned developmentally? For non-native English speaking students, to what extent will they be using English? What kinds of things will they need to be able to “do” in English? What will they need to write, and with whom will they need to converse? When possible, incorporate contexts, tasks, procedures, and materials specific to the job or career. Collect authentic work documents, forms, manuals, etc. from local employers for use in the classroom.

Other essential basic skills you will want to consider are those soft and technical skills labeled as “Next Skills”: the skills that up to 82% of employers surveyed in 11 workforce studies identified as among those most important for worker success. They are encompassed in the eight modules of the *Next Skills Institute* training program:

- a. Creativity and Innovation
- b. Valuing Diversity
- c. Navigating Technology
- d. Effective Listening
- e. Verbal Communication
- f. Employability Skills
- g. Service Orientation
- h. Interpersonal Skills for Building Teamwork

All of the modules include threads of critical thinking, decision making, problem solving, and collaboration woven throughout to ensure that these skills are consistently reinforced (Los Rios WpLRC, 2008). The need for workers with these skills crosses all industries in California and

across the nation. These are people who can successfully navigate typical workplace scenarios and challenges. Similar curricula have come out of Merced College Workplace Learning Resource Center: the *Customer Service Academy* and *Thrive and Survive*. The curricula for all three of these programs are made available to other community colleges by way of train-the-trainer workshops sponsored by the California Community College System Office Economic and Workforce Development Program. Modules in these training programs are already contextualized for the workplace; they could easily be further contextualized for any CTE program with job-specific or career-specific anecdotes, activities, and scenarios.

3. Plan ways to assess your students periodically in class to identify their basic skill weaknesses and strengths, as well as to measure their progress. There are examples of basic skills pre-tests available statewide from faculty who are assessing students in programs like Surveying and Mapping, Utilities and Construction Prep, and Manufacturing to name a few (see appendix for sample assessment tools and lessons). Create your own quizzes and tests based on what you have taught as the content of your class and that incorporate the applied contexts you have introduced.
4. Develop brief, relevant, authentic, contextualized lessons that give students ongoing opportunities to learn, practice, and apply these skills in varied situations. You may need to ask for help from colleagues who are subject matter experts—ESL instructors, for example who can assist you in simplifying language for non-native English speakers. Continually reinforce these new skills at regular intervals by expecting student practice and application. Make sure that whatever you design is relatable and relevant to the course and transferable to the future job.
5. Place these supplemental lessons and materials “behind” those chapters or syllabus topics where they will be needed. Consider having students work on these in groups or with peer tutors. Find out whether your college’s tutoring program or learning resource center can offer your students additional assistance.
6. Team up with faculty from basic skills departments to help you develop lessons. The development process enumerated here presumes that you, the CTE instructor, are the sole instructor of your class and are developing and integrating your own basic skills lessons into the overall class content. Nevertheless, be aware that when budgets allow, instruction can be contextualized using different methods: bridge programs that run sequentially and can have an academic or occupational focus; concurrent programs that are offered at the same time a student is taking CTE courses; or integrated programs (sometimes called learning communities) where basic skills content is embedded in the CTE course. In the integrated model, co-instruction (one mathematics/English/ESL, one occupational or academic), faculty work together to offer the class. Extensive professional development is required to rewrite curricula. Overcoming policy and institutional barriers to dual enrollment/dual credit will need to be achieved but the potential for big payoffs are evident in programs around the country. (Strawn, 2008).

Aside from creating your own contextualized materials or obtaining materials that have already been developed by other community colleges, there is much that can be purchased commercially. ACT, Inc., has created a series of workplace skill assessments called *Work Keys®*. A National Career Readiness Certificate™ can be awarded for passing scores on three of these *Work Keys®* assessments: Locating Information, Reading for Information, and Applied Mathematics. A partner

company, *Key Train®*, provides instructional computer software that is compatible with the *Work Keys®* assessments, so that students who score lower than needed for a particular job can improve their skills prior to re-taking the assessments. *Key Train®* has also come out with *Key Train®* Career Clusters, which are supplementary modules contextualized for all career clusters as defined by the Department of Labor. These kinds of products have been used with much success. However, you will want to take the time to thoroughly investigate and review all of your options before deciding what might work best for your program, budget, and goals.

Taking Steps to Serve all our Students

California faces huge economic challenges as retiring baby-boomers leave the workforce and as new technologies and industries develop. The educational challenges for the state are significant as California tries to help more of its residents escape low-wage work and move into family-supporting jobs by earning in-demand, postsecondary credentials (Strawn, 2008). The Basic Skills Initiative of the California Community Colleges encourages you to start today, building your contextualized curriculum network and improving education for our valued citizens, helping to construct the structures that will improve their lives.

Appendix Chapter 13



Working with Students with Basic Skills Needs In Career and Technical Education (CTE): Completing the Building Part I

Appendix 1: SCANS Skills

Appendix 2: Contextualized Mathematics Earth Day Quiz

Appendix 3: Contextualized Mathematics lesson from Graphic Arts

Appendix 4: Resources for Chapter 13

Appendix 1

Secretary's Commission on Achieving Necessary Skills (SCANS)

The following description was taken directly from the Department of Labor's website on SCANS skills (SCANS, 1990).

“As the focus in the state increasingly moves toward meeting workplace demands, it will be useful for all faculty to understand what SCANS is. Here is a brief summary. Educators, especially in vocational programs and workplace representatives who interact with K-12 and CC faculty are familiar with and often refer to SCANS skills. The levels of expected competency in each SCANS area varies by occupation. For example, the SCANS level expected for an entry-level position would be much lower than that of a manager.

Background

In 1990, the Secretary of Labor appointed a commission to determine the skills our young people need to succeed in the world of work. The commission's fundamental purpose was to encourage a high-performance economy characterized by high-skill, high-wage employment. Although the commission completed its work in 1992, its findings and recommendations continue to be a valuable source of information for individuals and organizations involved in education and workforce development.

What Work Requires of Schools

The Secretary's Commission on Achieving Necessary Skills (SCANS) was asked to examine the demands of the workplace and whether today's young people are capable of meeting those demands. Specifically, the Commission was directed to advise the Secretary on the level of skills required to enter employment. In carrying out this charge, the Commission was asked to:

- Define the skills needed for employment;
- Propose acceptable levels of proficiency;
- Suggest effective ways to assess proficiency; and
- Develop a dissemination strategy for the nation's schools, businesses, and homes.

This report results from the Commission's discussions and meetings with business owners, public employers, unions, and workers and supervisors in shops, plants, and stores. It builds on the work of six special panels established by the Commission to examine all manner of jobs from manufacturing to government employment. Researchers were also commissioned to conduct lengthy interviews with workers in a wide range of jobs.”

WORKPLACE KNOW-HOW

The know-how identified by SCANS is made up of five competencies and a three-part foundation of skills and personal qualities needed for solid job performance. These include:

COMPETENCIES. *Effective workers can productively use:*

- ▶ **Resources:** *allocating time, money, materials, space, staff;*
- ▶ **Interpersonal Skills:** *working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;*
- ▶ **Information:** *acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information;*
- ▶ **Systems:** *understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems;*
- ▶ **Technology:** *selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.*

THE FOUNDATION. *Competence requires:*

- ▶ **Basic Skills:** *reading, writing, arithmetic and mathematics, speaking and listening;*
 - ▶ **Thinking Skills:** *thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning;*
 - ▶ **Personal Qualities:** *individual responsibility, self-esteem, sociability, self-management and integrity.*
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Appendix 2 A General Contextualized Math Quiz

Earth Day Quiz

Here's a mathematics quiz developed by Kerin Keys and Anna Werner of City College of San Francisco kkeys@ccsf.edu

Directions: *Select the letter of the best answer for each question below.*

1. The average American uses 159 gallons of water per day. The average person in half of the rest of the world uses 25 gallons per day. What percent more does the average American use?
a. 636% b. 5.36% c. 536% d. 6.36%

2. Fill in the blank with the correct symbol: Energy used by the U.S. _____ Energy used by all developing countries combined.
a. = b. > c. <

3. To produce each week's Sunday newspapers, approximately 500,000 trees must be cut down. Considering that a high density forest has 250 trees per acre, how many acres of forest is that per year?
a. 26,000,000 b. 104,000 c. 2,000 d. 24,000

4. The following environmentally related job uses math every day:
a. solar power engineer
b. environmental attorney
c. environmental policy analyst
d. all of the above

5. The EPA estimates that you can save 12% on your utility bills if you use energy efficient appliances and insulate your house or apartment. If an average household pays \$150 a month during half of the year (summer and winter months) and \$75 a month during the other half, how much savings is that in a year?
a. \$27 b. \$118 c. \$162 d. \$81

6. The average American generates 52 tons of garbage by the time they are age 75. Approximately how many pounds of garbage is this per day?
a. 0.002 pounds per day b. 0.694 pounds per day
c. 2 pounds per day d. 3.8 pounds per day

7. Recycling just 1 ton of aluminum cans rather than throwing them away conserves the equivalent of 1655 gallons of gasoline. In 2006, the US generated 3.26 millions of tons of aluminum waste and 21.2% of it was recycled. How many gallons of gasoline did that save?
a. 1,143,803,600 b. 114,380 c. 41,760 d. 11,438,036

8. Since 1960 the EPA has collected data on the generation and disposal of waste. The municipal solid waste in millions of tons are in the table below:

| | | | | | | |
|------|-------|-------|-------|-------|-------|-------|
| 1960 | 1970 | 1980 | 1990 | 1995 | 2000 | 2006 |
| 88.1 | 121.1 | 151.6 | 205.2 | 214.3 | 238.3 | 251.3 |

What is the approximate percent increase between the years of 1960 and 2006?

- a. 285% b. 85% c. 185% d. 35%
9. If the best fitting linear model for the data in the previous example is $y = mx + b$ where x is the year, and y is the solid waste in millions of tons, calculate what predicted amount of solid waste will be generated 15 years from now.
- a. 311.43 b. 7122.8
c. 55.6 d. 318.84
10. Every ton of mixed paper recycled can save the energy equivalent of 185 gallons of gas. In 2006, in the US, of the 251.3 million of tons of solid waste 33.9% was mixed paper, and we recycled 51.6% of the total mixed paper waste. How many gallons of gas did we save?
- a. 94,372.2 b. 94,372,181,500
c. 8,132,304,222 d. 8,132.3
11. The annual amount of waste the Red Bluff landfill in California accepts is 60,000 tons and its capacity is 2.9 million tons. Currently it has 1.5 million tons in it. At this rate, when will the landfill close?
- a. 2033 b. 2013 c. 201 2 d. 2031
12. Some hybrid cars average 41 miles per gallon. If in 10 years you drive one an average of 15,000 miles per year, how many gallons of gas will you use less than if you were driving a car which averages 25 miles per gallon?
- a. 3659 b. 146 c. 3634 d. 2341
13. The circumference of the earth is approximately 24,900 miles at the equator. If we lay sheets of paper 11 inches long end to end, how many pieces of paper will it take to go around the earth?
- a. 131,472,000 b. 143,424,000 c. 1,577,664,000 d. 191,232,000
14. Based on your answer above, if Americans use a total of 4.3 billion sheets of paper per day, approximately how many times would that circle the earth (every day!)?
- a. 5 times b. 25 times c. 30 times d. 40 times
15. I can personally protect the environment as a math student by:
- a. using both sides of notebook paper and the clean side of used printer paper
b. using a refillable lead pencil
c. re-using folders from one semester to the next
d. all of the above.

Thanks for your quiz participation and for supporting Mother Earth

Appendix 3

Sample of Contextualized Learning for Graphic Arts

This sample lesson could be used in an arithmetic course to show the use of simple math in a professional field.

Graphic Arts

Instructor: Lin Marelick

Lesson: Paper Trimming

In this lesson you will learn to use printer's vocabulary and arithmetic to trim paper for use on a small (11 x 17 inch) printing press. Work in teams of four to complete the lesson.

Vocabulary¹

Parent Sheet: larger size sheets of paper used by commercial printers are called parent sheets. These large sheets of paper are typically printed to fold into smaller sizes such as for booklets or brochures. Or, parent sheets are printed then cut into smaller sizes. Standard parent sheet sizes are 17 x 22, 19 x 25, 23 x 35, and 25 x 38 (North American sheet sizes) or A2, A1, and A0 (ISO-international sheet sizes).

Broadsheet: 22 x 34 sheet of paper that is trimmed from a parent sheet to easily cut and retrieve tabloid, letterhead, and digest (5.5 x 8.5) size sheets of paper without waste.

Tabloid: a sheet of paper that is half the size of a broadsheet and twice the size of standard letter size paper is known as **tabloid** size. Tabloid is an 11x17 sheet size.

Examples: Tabloid is a common size paper for printing newsletters (then folded) or newspapers that are smaller than standard. The "Tabloids" or "Tabloid newspapers" characterized by sensational or bizarre news stories get their name from the tabloid sheet size.

Ream: is 500 sheets of printing paper, a common retail package size for inkjet, laser, and copy paper.

Basis Weight: The weight, measured in pounds, of 500 sheets (a ream) of paper cut to a standard size is its **basis weight**. That standard size (basic size) is not the same for all paper grades. The major paper grades such as bond or cover have their own standard sizes which, determine the basis weight for that grade of paper regardless of the final size of the paper.

Examples: Bond paper, such as used in laser printers and copy machines, typically has a basis weight of 13-25 lbs. That weight is based on 500 sheets in a basic size of 17 x 22 inches although the paper is generally sold in 8½ x 11 inch sheets. Papers for many offset printing projects range in basis weight from 22-150 lbs.

Cutting paper

1. Choose 3 parent sheets of bond paper.
2. On a second piece of note paper (8.5 x 11 inch) draw a diagram for how you will cut each paper size listed below from a parent sheet of paper that is 23x35 inches. Also show the arithmetic used to cut from the parent sheet with the least amount of waste:
 - a. tabloid
 - b. letter head
 - c. digest size paper

¹ Source of definitions: http://desktoppub.about.com/od/glossaryd/Glossary_Words_D.htm

3. Once you've determined the least amount of waste for each smaller sheet size, use a ruler and draw a guide of the trim lines on three parent sheets (one for each smaller sized paper) listed in step 2.
 4. Use the parent sheet with the trim lines as your cutting guide. Use one ream of parent size paper for each cutting guide and cut the tabloid, letter head, and digest size sheets.
 5. When done cutting, how many sheets of paper do you have in each size:
 - a. Tabloid?
 - b. Letterhead?
 - c. Digest?
 6. Stack your cut paper on the counter in the press room in the following way: tabloid on the bottom, letterhead in the middle, and digest size on top with your math problems and the names of each team member attached with a piece of tape to the top of you paper stack.
-

Reference Sample: paper cutting a variety of sheet sizes from a broadsheet.²

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

² <http://desktoppub.about.com/od/paper/g/tabloid.htm>; by J. James
Chapter 13

Appendix 4

Resources for Chapter 13

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Other Resources

ACT, Inc. *Work Keys*® (<http://act.org/workkeys>) and National Career Readiness Certificate™ (<http://www.act.org/certificate/index.html>).

El Camino Community College District Workplace Learning Resource Center. Hawthorne, California. Phillip Sutton, Director (310) 388.4500.

Key Train™ (<http://www.keytrain.com>).

Los Rios Community College District Workplace Learning Resource Center (2008). "About Next Skills," *Next Skills Institute*, Sacramento, California. (<http://wplrc.losrios.edu/nextskills/index.html>) Valerie Carrigan, Director (916) 563-3253.

Merced College Workplace Learning Resource Center. Merced, California.
(<http://www.customerserviceacademy.org> and <http://www.thriveandsurvive.org>) Robert Vincelette, Director (209) 386-6734.

Mission College Workplace Learning Resource Center. Santa Clara, California.
(<http://www.missioncollege.org/workforce/WpLRC>) Bruce Whistler, Director (408) 855-5204.

Oxnard College Workplace Learning Resource Center; Oxnard, California.
(http://www.oxnardcollege.edu/departments/administrative/dean_of_economic_development_and_innovation/workplace_learning_resource_center.shtml) Lucia Haro, Director (805) 986-5874.

Washington Center. Learning Communities National Resource Center
<http://www.evergreen.edu/washcenter/lcfaq.htm#21> .