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# CAREER -TECHNICAL EDUCATION FOR MIXED ABILITY CLASSROOMS

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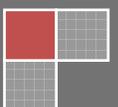
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## INTRODUCTION

The purpose of this manual is to provide an overview of some of the most commonly used strategies to improve student learning outcomes in the classroom, lab, and in career and technical student organizations (CTSOs). The manual has been organized around the definition of universal design for learning (UDL) which includes components of universal design, differentiated instruction, cooperative learning, and the use of special education support services. Universal design for learning (UDL) has been broadly defined by the Higher Education Opportunity Act of 2008 (Public Law 110-315) as a scientifically valid framework for guiding educational practice that—

*provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient §103(a)(24).*

This definition identifies the essential elements for improving learning, not only for students with disabilities, but for all students. These elements can be summarized as: (a) flexibility in presentation, (b) flexibility in student response or demonstration, (c) flexibility in engaging students, and (d) eliminating barriers for students with special needs. To effectively implement these strategies, it is recommended that Career-Technical Education (CTE) teachers go through training and use the website developed to support this manual at [www.cteproject.com](http://www.cteproject.com).

The tools used in this training draw on five evidence-based instructional strategies: (a) direct instruction, (b) indirect instruction, (c) experiential learning, (d) independent study, and (e) interactive instruction. Because career-technical educators have limited time, CTE project staff and collaborators have developed four training modules and a web-based interactive reference guide designed to provide basic competencies for serving all students.

Training is to be offered at regional sites in Ohio and is targeted to career-technical leaders responsible for staff development and special needs students. The training consists of four 1 ½ hour modules. These modules can be presented individually or together as a one-day training session. They are designed to be presented and used by CTE staff. The four modules are:

1. *Flexibility in Presentation through Universal Design* - This module presents a tool designed to develop three key competencies: (a) identifying key concepts from competency descriptors, (b) presenting key concepts using visual and audio enhancements, and (c) using graphics to guide direct and indirect instruction.
2. *Engaging Students* - This module presents a tool designed to develop four key competencies including: (a) guided notes and outlines, (b) mnemonics, (c) feedback and reinforcements, and (d) task analyses.

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3. *Differentiating Student Responses to Instruction* - This module presents a tool designed to develop two key competencies to enhance student responses to instruction including: (a) differentiated assignments and (b) cooperative learning.

4. *Providing Opportunities for Special Needs Students*- This module is designed to provide: (a) an overview of the laws pertaining to serving students with special needs in career-technical education, (b) enrolling students in career-tech education, (c) defining success for students with disabilities in CTE, and (d) identifying and obtaining needed supports for special needs students.

Project staff will be available to consult with your program to discuss your training needs and how these modules and the CTE project website [www.cteproject.com](http://www.cteproject.com) can assist you in better serving all students attending career-technical education programs.

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## MODULE 1: FLEXIBILITY IN PRESENTATION OF CONTENT THROUGH UNIVERSAL DESIGN

### A. *Graphic Organizers*

There are many types of graphics organizers that can be found on the web. One site <http://www.teachervision.fen.com/graphic-organizers/printable> provides many different graphic organizers that can be useful in explaining concepts. Before using any graphic organizers, it is important to describe the graphic organizer routine. Students should be made aware of how the graphic organizer will be used and how it should help them learn and remember the material. It should be emphasized that they will be involved in the development of the graphic organizer and that they should use it to help them organize their notes. For some students it may be important for them to copy the graphic organizer and more advanced students may be used to help struggling students in this process.

Graphic organizers need to reflect good teaching practice. Research indicates that students learn more when they are: (a) actively engaged, (b) when abstract concepts are presented in concrete terms, (c) when information is organized for them, (d) when important information is highlighted, and (e) when relationships between concepts are stated (Deshler & Shumaker, 2005). While many types of graphic organizers are available, none have been better researched than a method known as *Content Enhancement* (which is part of the *Strategic Instruction Method-SIM*). This approach provides a graphic teaching system that: (a) highlights major concepts, (b) shows relationships between ideas, (c) ensures relevance to students' previous learning and experiences, and (d) jointly engages teachers and students in the creation of knowledge. (Deshler & Shumaker, 2005). The use of this approach has been found to improve overall student performance by nearly a full-grade point; however this requires a full week of training to master the many routines and sub-routines. Content Enhancement graphic organizers can be found at <http://courses.stratopedia.org/course/view.php?id=19>.

The graphic organizers presented on the following pages closely follow the *Content Enhancement* model routines for: (a) unit organizers and (b) lesson organizers. Figure 1 shows how a teacher can introduce a new unit to students. It includes the following eight steps which are labeled on the matrix in Figure 1:

1. Introducing the unit
2. Asking students to describe it in their own words.
3. Reviewing the previous unit and describing how it relates to the current unit.
4. Describing the next unit and how it relates to the current unit
5. Discussing the big question the unit is designed to answer and its relevance.
6. Highlighting key concepts that will be covered in the unit
7. Identifying self-test questions that students need to answer
8. Outlining the key activities to develop and test student learning



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## 1. Introducing Students to the Use of Graphic Organizers

Learning routines must be understood and consistently used to improve student outcomes. It is important to introduce students to the use of graphic organizers and the learning rituals that go along with them. The teacher needs to explain that the purpose of the graphic organizer is to help students learn and remember better. They need to know that they will be expected to participate in developing the graphic organizer along with the teacher. The teacher then needs to describe the major steps of the graphic organizer routine and how it will help them:

- Create a context for the information presented (steps 1-3)
- Describe what the concept means and why it is important (steps 1b, 4)
- Identify key concepts (step 5)
- See the relationship between key concepts (step 6)
- What questions they need to answer in following the unit/lesson (step 7)
- What tasks are used to present the content and measure learning (step 8)

The teacher may choose to use graphic organizers to: (a) introduce the course, (b) introduce a unit within a course, and (c) to present daily lessons. While graphic organizers can be used for lessons alone, it is recommended that teachers also use them to at least introduce the unit.

Graphic organizers can be delivered a number of ways: (a) Power Point presentations, (b) overheads with markers, (c) easels with poster boards, (d) butcher block paper on the wall, and (e) large sticky notes on the wall or poster board. It is important that the teacher be comfortable with the graphic organizer and that it not impede or slow down teaching. The teacher may hand out partially completed graphic organizers to be filled in by students as the course progresses (advance organizers). Another method is to have students copy the graphic organizer from a Power Point or overhead projector as it is developed by the teacher. Teachers may choose to have students hand in their graphic organizers at the end of class and/or may provide copies of the teacher's completed graphic organizer at the next class.

## 2. Mapping a Career-Tech Unit Using a Graphic Organizer

So now the question becomes how this approach might be applied to a career-tech unit and individual lessons. Figure 2 shows how the graphic organizer matrix in Figure 1 can be used to introduce the Safety and Sanitation unit in the Culinary and Foodservice Operations Pathway. In Step 1 – the teacher introduces the unit and asks students to describe Safety and Sanitation in their own words. The teacher then provides a context for the current unit by describing how it fits with the previous units (Step 2) and the following unit (Step 3). The teacher then asks students what this unit means to them and why it is important (Step 4). The teacher introduces the key concepts (or competencies) related to the unit (Step 5) and asks students to look at how they are related (e.g., sequences, cause and effects) (Step 6). The teacher should then lead the students in identifying self-test questions that need to be answered after completing the unit (Step 7). Finally, the teacher outlines the activities that will be used to develop and measure student understanding.

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**Figure 2. Sample Unit Organizer**

3. Last Unit: <i>Introduction</i>	1. Current Unit: <i>Safety and Sanitation</i>	4. Next Unit: <i>Operations and Management</i>
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5. The big question for this unit is:  
***What are the threats to health and safety in the culinary arts and how do we prevent them?***

8. Unit Schedule	
Date	Activity
10/1	Unit 15.1
10/5	Quiz 15.1
10/8	Unit 15.2
10/13	Paper on school health codes
10/16	Unit 15.3
10/21	Paper -interview custodian
10/24	Review
10/25	Mid-term test
10/26	Unit 15.4
11/7	Pest report due
11/7	Unit 15.5
11/13	Quiz 15.5
11/17	Unit 15.6
12/1	Review
12/4	Hazard analysis report
12/5	Final test

6. The key concepts are:

```

graph TD
    A[6. The key concepts are:] --- B(Safety procedures (15.1))
    A --- C(Health codes (15.2))
    A --- D(Sanitation duties (15.3))
    A --- E(Control Pests (15.4))
    A --- F(Safe work Environ. (15.6))
    A --- G(Hazard Analysis (15.5))
    
```

2. Is about: *Keeping people from getting sick or hurt preparing food*

7. These are the questions you need to answer from this unit:

1. *What are common causes of accidents and what safety procedures prevent them?*
2. *What are common health violations that need to be avoided; who enforces them?*
3. *What are the sequence and schedule of common sanitation and pest control procedures?*
4. *What does the acronym FATTOM stand for and how is it used in hazard analysis?*
5. *Name the major characteristics of a safe work environment and how they can be encouraged.*

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### 3. Developing a Graphic Organizer for a Lesson

Once the unit map has been developed, the teacher needs to figure out how to graphically present each of the competencies as lessons. In career-technical education, the descriptors for each competency are designed to be comprehensive, but are not necessarily well organized for teaching. For example, the descriptors for competency 15.5 are:

#### **Competency 15.5: Follow hazard analysis critical control point (HACCP) system.**

##### **Descriptors:**

- 15.5.1 Identify reasons that many common foods are potentially dangerous.
- 15.5.2 Explain how time and temperature affect microorganism growth.
- 15.5.3 Distinguish among food poisoning, chemical poisoning and food infection.
- 15.5.4 Identify hazards related to food additives (e.g., monosodium glutamate (MSG)).
- 15.5.5 Explain biological hazards (e.g., bacteria, viruses, parasites).
- 15.5.6 Summarize physical hazards (e.g., glass fragments, staples).
- 15.5.7 Describe chemical hazards (e.g., cleaning agents, pesticides).
- 15.5.8 Identify and comply with standards established for the safe heating, reheating and cooling of foods.
- 15.5.9 Describe good personal hygiene and how it affects food safety.
- 15.5.10 List the steps in proper hand washing.
- 15.5.11 Categorize and describe the microorganisms that cause food borne illnesses.
- 15.5.12 Identify and list ways that chemical and physical hazards can contaminate food
- 15.5.13 Distinguish between situations in which contamination and cross-contamination can occur.
- 15.5.14 List the conditions under which bacteria multiply rapidly and use the letters FATTOM (food, acidity, time, temperate, oxygen, moisture).
- 15.5.15 Define the food temperature danger zone and list temperatures that fall within that zone.
- 15.5.16 Differentiate among types of thermometers and demonstrate how to use them.
- 15.5.17 List the seven major steps in a HACCP food safety system.
- 15.5.18 Outline proper procedures in the use of proper tools and equipment for receiving, storing, preparing, cooking, holding, cooling, reheating and serving food.
- 15.5.19 Compare the different types of storage found in a culinary foodservice operation.
- 15.5.20 Define the difference between clean and sanitary.
- 15.5.21 Practice procedures for cleaning and sanitizing tools and equipment
- 15.5.22 Maintain proper records

*Figure 3* shows a matrix that can be used to organize these competency descriptors into more easily understood format:

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**Figure 3. Matrix for Lesson Organizer**

3. Last Competency:	1. Current Competency:	4. Next Competency:
5. Big Question:		
<div style="border: 1px solid black; display: inline-block; padding: 5px 20px; margin-bottom: 10px;">6. Key Concepts</div> 		
2. Is about:		
7. Self-test questions:	8. Tasks	

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The first step in presenting a lesson for a competency area is to identify how the current competency relates to what the student learned before and will learn next. In organizing the lesson for each competency area, the unit organizer provides the context for the current lesson. *In Step 1*, the teacher asks the students, “What did we cover in the last lesson?” to elicit the response that the last unit was about controlling pests. *In Step 2* the teacher explores and identifies a connection between the topic and what students already know by *paraphrasing* the competency description in the students’ own words. The teacher asks, “What is hazard analysis about?” to help students describe the topic in their own words such as, “This topic is about, “keeping food safe” This student definition of the lesson is then placed under the formal definition to provide students a connection between the formal lesson title and what they already know.

*Steps 3 and 4* create a context for learning by showing how the lesson connects to the previous lesson and what will be covered next. For *Step 3* the teacher might ask, “What did we cover last?” to elicit the response that the last lesson was about controlling pests. (The teacher may choose to ask what the key concepts of the last lesson were to assess student readiness for this lesson.) In *Step 4* the teacher might ask, “What will we be covering next?” to elicit the response that the next unit is about maintaining a safe work environment. In *Step 5*, the teacher then asks, “What is the big question that these units have in common?” to elicit the response that all three units are about keeping people safe. The big question should tell students why the information is important and relevant to them.

In *Step 6* the teacher needs to identify a few key concepts for this unit. Rather than simply writing these on the board, the teacher asks probing questions to get students involved. Questions might include, “What kinds of things might cause people to get sick from food?” The teacher would be looking for answers such as, “Not washing your hands,” or “Letting the food spoil,” or “Not cooking the food right,” or “Not cleaning the equipment.” When these responses have been elicited, the teacher can then write down the key concepts that he or she identified in preparing for the lesson. If students bring up additional concepts, the teacher may choose to add these to graphic organizer.

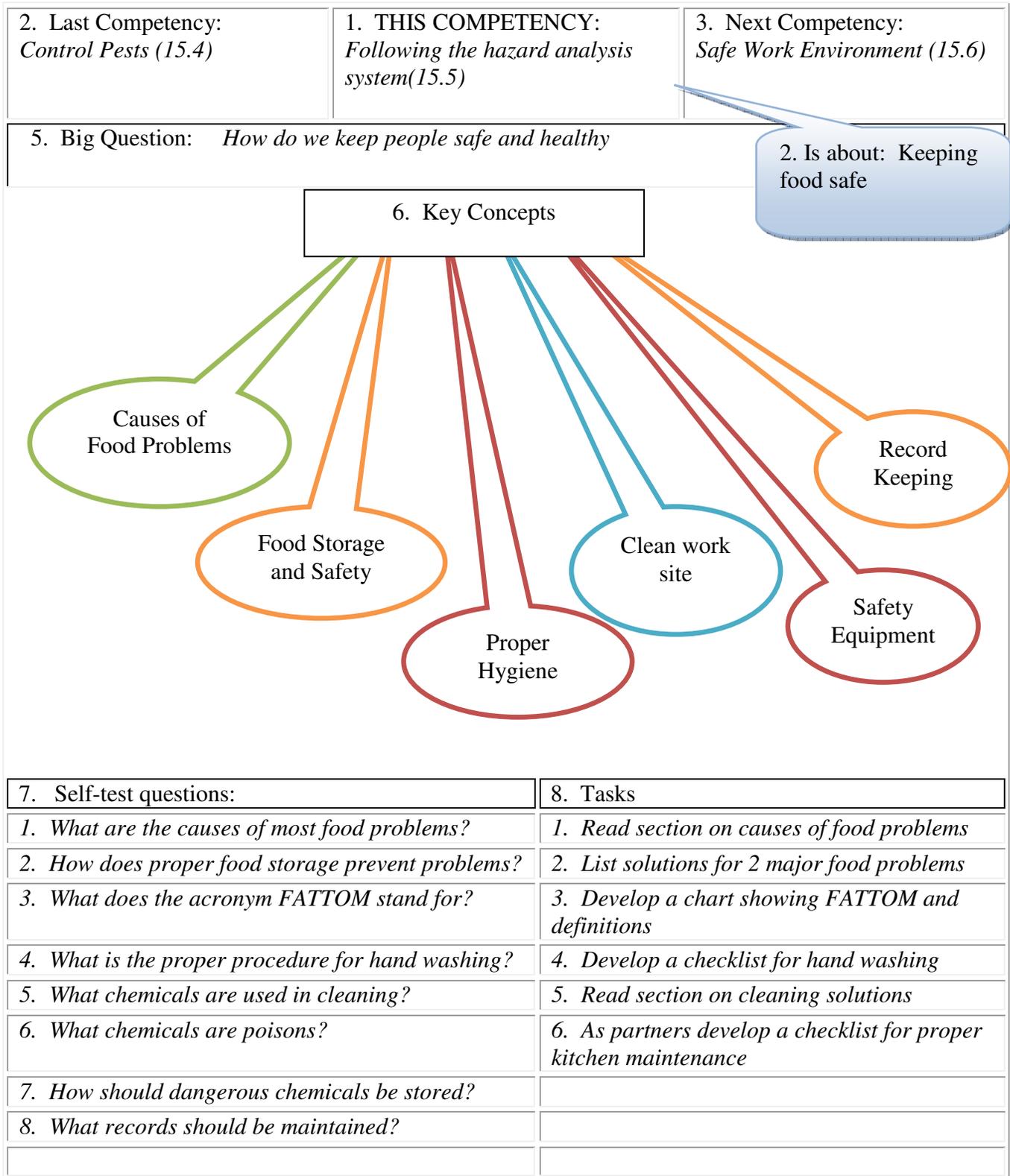
In *Step 7*, the teacher describes what the students should learn from this lesson. These self-test questions should be similar to the questions that are asked on tests and quizzes. They may also be the basis for projects and independent study. Questions may be asked in many forms including:

1. Guiding students in defining terms within key concepts
2. Discussion of how each concept relates to students’ own experiences
3. Asking students to identify the benefits of understanding the concept
4. Guiding students in identifying characteristics of key concepts
5. Asking students to give examples and non-examples of key concepts
6. Guiding students in identifying relationships and similarities among key concepts
7. Helping students to identify parts of a key concept

In *Step 8*, the teacher outlines the tasks that will help the students learn the key concepts from the lesson. Tasks may include anchoring activities that can be worked on by students independently, cooperative activities to develop team work, and differentiated assignments to allow students to learn in their own way. (See Section on Differentiated Instruction.)

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**Figure 4. Sample Lesson Organizer**



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### 4. Using Comics and Graphic Novels

Pictures and videos may also be helpful in presenting key concepts. Because today's students are familiar with comic strips and graphic novels, they can be used to improve recall of key competencies. A number of computer programs are available for free or very low cost to help teachers do this including [www.makebeliefscomix.com](http://www.makebeliefscomix.com) and *Comic Life* at [www.plasq.com](http://www.plasq.com). *Comic Life* allows the teacher to develop graphical depictions of actions using any digital photographs or graphics from the web. For students with autism spectrum disorders computerized graphics can be used to develop *Social Stories* (Gray, 2004) which prepare these students for upcoming events. For students with intellectual disabilities, graphical depictions can convey concepts for students with limited reading comprehension. The following figure shows a very simple depiction of the concept of "proper hand washing."

**Figure 5. A graphic depiction of the importance of hand washing**



### ***B. Auditory Enhancements to Improve Verbal De-coding***

While this module has focused on graphic organizers which pair visual images to improve verbal understanding, there are a wide range of educational technologies which can enhance presentation. One widely used method is the creation of a "sound field" where the teacher uses a microphone and speakers in the four corners of the room to make it easier for students to hear. This improves learning by: (a) decreasing the amount of effort used in decoding verbal content and (b) screening out distractions. For students with hearing impairments, the sound field can be complemented with a FM headset worn by individual students.

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**GROUP EXERCISE FOR MODULE 1:** *Identify a unit and core set of competencies from the technical standards document and use the matrix above to develop a graphic organizer which (a) describes the current competencies in words relevant to students (b) shows the previous competencies, (c) shows the next competencies, (d) identifies a big idea that ties the competencies together, (e) graphically shows key concepts emanating from the current competencies.*

## MODULE 2 – ENGAGING STUDENTS

### A. Guided Notes and Outlines

Advance organizers can engage students in learning by providing them with supports in taking notes and recalling the key concepts presented in a lesson. Many teachers who use Content Enhancement have the student copy the outline as the teacher presents the material and then add their own notes to it. These outlines can be collected by teachers at the end of class to ensure that students have been following the lesson. They can then be returned to the student. Teachers may also want to provide students with other advance organizers such as key questions to be answered as the lesson progresses. For the previous example, a graphic organizer might consist of the student being given a list of questions to fill out from the lecture, such as:

**Figure 6. An example of a guided notes question**

- Guided note: What are the six key concepts related to hazard analysis?
1. Causes of \_\_\_\_\_
  2. Food \_\_\_\_\_ and Safety
  3. Proper \_\_\_\_\_
  4. Clean \_\_\_\_\_
  5. Safety \_\_\_\_\_
  6. \_\_\_\_\_ keeping

### B. Mnemonics

Another recall strategy with a strong evidence base is *mnemonics*. There are a number of mnemonic strategies but the two most common are: (a) key word mnemonics and (b) acronym mnemonics. Keyword mnemonics helps students remember by using illustrations of key words. For example, to remember the name, “Robert Baer” students could be presented an illustration of a bear with a mask. The keyword approach improves recall by providing students with a visual image that illustrates a verbal concept. With creativity these key word acronyms can be expanded to include actions or dates. For example, “Robert Baer comes from Wooster” might show the bear in a mask chasing a rooster, and so on.

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Acronym mnemonics are a good way of remembering lists. For example, a good way to remember names of the great lakes is the mnemonic “HOMES” for Huron, Ontario, Michigan, Erie, and Superior. In the list of hazard analysis competencies, the acronym FATTOM stands for food, acidity, time, temperature, oxygen, and moisture. The acronym approach to mnemonics improves recall by providing students with a single word or short phrase that prompts recall of a more complex set of information.

### ***C. Clear Objectives and Feedback***

Clear objectives and regular feedback is needed to engage all students. Clear objectives start with setting classroom rules, ensuring that students understand them, and then recognizing positive behaviors while correcting negative behaviors in a consistent manner. This requires a skill known as “with-it-ness” where the teacher maintains awareness of what is happening with all students while, at the same time, focusing on individual students. Because both negative and positive feedback may be reinforcing to students, it is important to provide more feedback to students who are exhibiting desired behaviors. Behavioral research indicates that positive attention should generally be used three times as much as negative attention. This means that teachers should try to “catch students being good.” Also, teachers should be aware that too many rules may make enforcement impossible. Consequently, the teacher should focus on enforcing important rules, while vigorously rewarding students who are on-task and exhibiting positive behaviors. When the teacher corrects misbehavior, the feedback should focus on the behavior rather than the student and provide alternatives to the problem behavior. Care must be taken that rules are enforced consistently across students.

In a mixed ability classroom the teacher should monitor and provide feedback to students as frequently as possible to improve engagement and to ensure that students are learning the material. One method for providing more frequent feedback is to provide each student with a small erasable board. As the teacher asks questions in class, students write their answer on their erasable board and hold it up. In this approach, students receive immediate feedback not only from the teacher, but by looking at the responses of their peers. The teacher is then able to monitor whether students are engaged and whether they are following what is being presented in class. More frequent feedback may also be selectively used for students who have trouble with staying on task. For example, a teacher might have a student with attention deficits turn in each page of a test or an assignment as it is completed.

The teacher’s relationship with students is the determining factor in how both positive and negative feedback is viewed by them. This relationship may be aided by having the students fill out index cards with information about themselves and their strengths, interests, and something unique about themselves or their birthday. Teachers can then refer to these cards to “personalize” interactions with students and to tailor recognition or reinforcements according to the student’s preferences. Simply remembering a student’s birthday or interests can go a long way toward strengthening the teacher-student relationship.

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### ***D. Task Analyses and Reinforcement Strategies***

Task analyses and reinforcement strategies are more systematic and individualized ways of developing clear objectives and feedback. A task analysis can be used to break a larger learning objective (or task) into smaller steps. The needs of the student and the complexity of the task determine the number and detail of steps. For instance, a fairly proficient student may use the task analysis primarily to guide him/her in the proper sequencing of specific behaviors which he/she has already mastered or may require only a few number of general steps specified. A less-proficient student may need each step broken down into its most basic components.

These steps are systematically learned by the student, typically through practicing the entire task or through backward or forward chaining strategies. In training the entire task the student practices each step. In backward chaining the teacher trains the student in the last step of the process until it is learned. The teacher then trains the next to last step of the task and “chains” it to the last step until the last two steps have been mastered. The advantage of backward chaining is that it allows the student to experience the completion of the task before all of the steps are learned. Forward chaining uses the same process beginning with the first step.

A good way of recording progress using a task analysis is to list the steps from bottom to top. Then simply cross through the numbers of the steps completed successfully and circle the total number of steps completed for that day. By simply connecting the circle numbers a graph of progress is generated. Table 2 shows an example of this approach for a weekly hand washing program. On Monday, the student completed step 1, and on Tuesday he completed step 2. On Wednesday he completed steps 1-3 and step 5 for a total of four steps (which is circled even though step 4 was not completed). On Thursday he completed steps 1-3 and step 5 and 6, so the number 5 is circled. On Friday he completed 1-3 and 5 and 8, so again the number 5 is circled. By connecting the circled items a graph emerges that shows students progress relative to the total number of steps completed. It can be helpful to generate blank weekly or monthly grids which are copied and simply filled in as task analyses are developed for individual students.

**Table 1. Weekly task analysis and recording sheet**

STEPS FOR HAND WASHING	Mon.	Tues.	Wed.	Thurs.	Fri.
8. Dry area around basin with towel	8	8	8	8	8
7. Dry hands	7	7	7	7	7
6. Turn off water	6	6	6	6	6
5. Rinse hands	5	5	5	⑤	⑤
4. Rub hands together vigorously	4	4	④	4	4
3. Apply soap	3	3	3	3	3
2. Wet hands	2	②	2	2	2
1. Turn on water	①	1	1	1	1

A task analyses may or may not be coupled with a formal reinforcement strategy to motivate learning of a task. Positive reinforcements refer to any event that

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“reinforces” or increases the likelihood of a response continuing or repeating, while negative reinforcements refer to an event that decreases the likelihood of a response continuing or repeating. Typically, students will obtain reinforcements through regular teacher feedback and from the satisfaction of mastering the task. However, some students may need artificial or “extrinsic” reinforcers to motivate them. Extrinsic reinforcements are those that do not normally occur in real settings and that have been added to a task or activity to motivate students to participate. Extrinsic reinforcements are often tangible (prizes, breaks, privileges, etc) and can create reinforcement dependency. Generally, the use of extrinsic reinforcements should be faded out over time so that the student can perform in natural environments without outside supports.

Reinforcements may also be used to motivate students to perform classroom tasks. In these situations, the teacher may develop a simple reinforcement strategy on the spot. The teacher might say something like, “When you complete your work, you may take a five minute break. A simple guide to using these types of reinforcers is the Premack (or grandma’s) principle which states, “I will do what you want me to do when you have done what I want you to do.”

### ***GROUP EXERCISE FOR MODULE 2:***

- 1. Develop a task analysis for a common household task***
- 2. Develop a mnemonic to help the student remember the steps in the task analysis***
- 3. Describe how you would reinforce or give feedback to the student in terms of:***
  - a. What reinforcement or feedback you would use***
  - b. When you would provide this reinforcement or feedback***
  - c. How you would begin phasing out the reinforcement or feedback***

## **MODULE 3 – DIFFERENTIATING STUDENT RESPONSES TO INSTRUCTION**

The concepts and strategies used in differentiated instruction are too numerous to cover in this manual and overlap with universal design. A number of books and websites explore this topic including <http://www.learnerslink.com/curriculum.htm>. Generally, differentiated instruction provides students with differing ways of learning the content as well as different ways of demonstrating their learning (or responding).

### ***A. Differentiated Assignments***

Differentiating the ways that students are allowed to respond to the content improves instruction by: (a) making it more relevant to student learning goals and (b) allowing students to approach learning in their own way. One of the most researched strategies for doing this is an approach developed by Carol Tomlinson (2001) known as “Think-Tac-Toe.” In this approach, students are given choices in how to explore the lesson by completing a line through a Tic-Tac-Toe board of assignments. These assignments are structured to allow students flexibility in how they approach and express knowledge about the core concepts of a lesson. The teacher may either direct students to complete a line of assignments based on students’ learning needs and goals, or allow students to choose for themselves which types of assignments they would like to

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complete. For example, career and technical education students who learn by doing may approach the assignment using the more applied assignments. Students who are more academically oriented in their learning or goals may approach the assignment using the more conceptual approaches to learning the material. In using this approach, the career-technical teacher needs to assure that the ways that student competencies are developed are aligned with students learning needs and postsecondary goals. In addition, the teacher needs to assure that all of the assignments are aligned with key concepts of the lesson that are in the middle box of the Think-Tac-Toe board.

The “Think-Tac-Toe” matrix included in Table 2 includes a number of ways of differentiating student learning. The vertical and horizontal axes that run through the core content box in the center include ways that students can explore the core concepts using primarily academic approaches. The diagonal axes running through the core concept box in the center include ways that students can explore the core concepts using applied visual, kinesthetic, tactile, or auditory approaches. The center box represents the core content that was discussed in class. The heading of each box indicates the general learning approach that is being emphasized, and each box includes key words to describe what the student needs to do. The activities in each box can be used as “anchoring” activities that provide students with greater depth of knowledge. Additionally, these anchoring activities may provide ongoing activities that students can work on during study periods or as part of homework assignments.

**Table 2. Think-Tac-Toe method of differentiating learning expression**

<b>Kinesthetic</b> whole body games, movement activities, making models, following instructions to make something, setting up experiments	<b>Knowledge</b> list, define, tell, describe, identify, show, label, collect, examine, quote, name, who, when, where	<b>Auditory</b> interviewing, debating participating on a panel giving oral reports participating in oral discussions of written material
<b>Comprehension</b> summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, discuss, extend	<b>Core Content</b> information is presented in sequential steps, lessons are structured and teacher- directed goals are clear requirements are spelled out	<b>Synthesis</b> combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalize, rewrite
<b>Visual</b> computer graphics maps, graphs, charts, cartoons, posters, diagrams, graphic organizers, text with a lot of pictures	<b>Evaluation</b> assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare	<b>Tactile</b> Drawing, playing board games, making dioramas, making models, following instructions to make something

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### ***B. Cooperative Learning Strategies***

Cooperative learning strategies can improve student engagement by creating activities that are reinforced through peer, as well as, teacher recognition. Cooperative learning, like differentiated instruction, is a very broad topic. Generally, cooperative learning assignments must meet two criteria: (a) each member’s effort is required and indispensable for group success and (b) each member has a unique contribution to make to the joint effort because of his or her role and task responsibilities. Cooperative learning experiences are important for students to develop social skills and to develop the ability to define their strengths and weaknesses relative to others.

A popular and well-researched cooperative learning approach is known as “Jigsaw” and can be found at <http://olc.spsd.sk.ca/DE/PD/instr/strats/jigsaw>. In its simplest form, the Jigsaw instructional strategy can be described as when:

- a. Students are assigned to diverse groups
- b. Each student in the home group is given a different portion of the assignment
- c. Students leave their "home" groups and meet in "expert" groups;
- d. Expert groups discuss the material and brainstorm ways in which to present their understandings to the other members of their “home” group;
- e. The experts return to their “home” groups to teach their portion of the materials and to learn from the other members of their “home” group

Using the Tomlinson “Think-Tac-Toe” approach above, each home group would include students who are academically-oriented and application-oriented and who have diverse learning styles such as visual, kinesthetic, tactile, and auditory. If we return to the topic of hazard analysis, the teacher could present the class with the assignment of developing a presentation on hazard analysis. The assignment could then be divided among the home group members into portions that look at hazard analysis from the various perspectives in the Think-Tac-Toe boxes. The students would then leave their home group to meet with members of other home groups with the same portion of the assignment. Finally, these experts would return to the home group which would put together the presentation on hazard analysis. The following figure shows how this assignment might be developed using the Tomlinson model.

**Table 3. Jigsaw assignment on hazard analysis**

<b>Kinesthetic</b> Develop a demonstration on proper hand washing techniques	<b>Knowledge</b> Define and explain each component of hazard analysis listed under the three key concept areas	<b>Auditory</b> Discuss hazard analysis and identify frequently asked questions
<b>Comprehension</b> Provide a two paragraph summarization of hazard analysis and why it is important	<b>Home Group Assignment</b> Develop a presentation and manual that addresses the key concepts in hazard analysis	<b>Synthesis</b> Develop a list of rules regarding hazard analysis that could be easily understood by employees

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<b>Visual</b>	<b>Evaluation</b>	<b>Tactile</b>
Explore the web to find videos and pictures that can be used in the presentation and manual	Develop a hazard analysis checklist that can be used to evaluate how well employees are implementing it	Obtain examples of chemicals that might be used in the kitchen

This example shows how students with differing skills can make a contribution to the joint effort of developing a manual and a presentation on hazard analysis. When the students return to their home group, the resulting presentation should incorporate each expert contribution to the overall group effort.

### ***GROUP EXERCISE FOR MODULE 3***

- ***Break back into your groups of 4-6***
- ***Plan to develop a “Safety Manual and Presentation” that includes***
  - ***A visual presentation of safety rules***
  - ***A brochure summarizing safety rules***
  - ***A demonstration of safety rules***
  - ***An oral presentation on safety rules***
- ***Send at least one home group member to the “expert group” tables marked, “visual, brochure, demonstration, and oral presentation”***
- ***Return to your home group and develop a brief description of your manual and presentation.***

## **MODULE 4 – PROVIDING OPPORTUNITIES FOR SPECIAL NEEDS STUDENTS**

The use of universal design for learning, differentiated instruction, and cooperative learning should meet most student needs. Yet, even after these approaches have been employed, some students will need individualized special education and support services. In using special education, it is important to understand some basic information about legislation underlying programs serving persons with disabilities.

### ***A. Overview of Legislation***

Prior to 1973, persons with disabilities had very few protections. They could be discriminated against in employment and they could be excluded from public education. The Rehabilitation Act of 1973 (Section 504) banned discrimination against persons with disabilities in public organizations and buildings. This legislation required the development of plans to provide accessibility to persons with disabilities who would otherwise be unable to access public services. The underlying philosophy of Section 504 was that persons with disabilities should have access to public services. The Americans with Disabilities Act of 1990 extended these requirements to businesses of more than fifteen employees.

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Prior to 1975 persons with disabilities could be excluded from schools and could be held in state institutions with no schooling or meaningful activities. A series of lawsuits in the early 70s established that persons could not be held in institutions without due process of law unless they were provided meaningful services. A logical extension of these lawsuits was that persons with disabilities should be provided schooling outside the institutions. The Education of All Handicapped Act (EHA) of 1975 required that schools provide:

1. Free appropriate public education (FAPE)
2. Least-restrictive environment (LRE)
3. Individual Education Programs (IEPs)
4. Multi-factored Evaluations (MFEs)

The Education of All Handicapped Act (EHA) was renamed the Individuals with Disabilities Education Act (IDEA) in 1990. The four basic tenets of the EHA and the later IDEA have remained largely the same over the years, but school reforms in the 1980s and 1990s led to additional requirements including:

1. Stay-put requirements that limited change of placements and suspensions
2. Manifestation hearings to limit suspensions due to problems related to a disability
3. Transition planning to provide students support in entering productive adult roles
4. Requirements that students with disabilities participate in curricula and testing related to the general education curriculum

Career-technical education also began requiring greater access to persons with disabilities starting with the Carl D. Perkins Vocational Act of 1984 which required vocational programs to use 10% of their funds for students with disabilities. The Carl D. Perkins Act of 1990 repealed the 10% set-aside, but required career and technical education programs to assure:

1. Equal access to enrollment and a full-range of vocational programs
2. Career-technical education in the least-restrictive environment
3. Coordination of career-technical education with students' IEPs
4. Notification to students and families one-year prior to eligibility for CTE services
5. Provision of transition and supplemental services

*The Perkins Act of 2006* requires states and career-technical providers to provide support for students with disabilities and to assess how the needs of those students are being met.

### ***B. Enrolling Students in Career-Technical Education***

The mission of Career-Technical Education is to prepare students for careers and for postsecondary education. CTE is accessible to all students, but is not appropriate for every student. In considering enrollment for students with disabilities, the IEP team determines whether a program will benefit a particular student and whether that student can best be served in that program versus being served through some type of work-study program or other services through the local high school rather than through CTE programming. Local schools should provide career education services for all students.

When the IEP team considers placement in a CTE program, they will want to determine whether a student will be able to complete all the competencies in a program (all competencies for a program are listed in the Career Field Technical Content Standards on the Ohio Department of Education website) or whether they will need to

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modify the content standards of the program. If modification is needed, then the question is whether the student can complete a sufficient number of competencies from the career field to be employable or to enter postsecondary education.

Also, it might be helpful for the IEP team to consider what is allowable in the workplace. The Americans with Disabilities Act of 1990 outlines the types of accommodations that employers need to make for persons with disabilities. The ADA contains a few key elements that should be used in determining whether the student could succeed in the field of choice. These are:

- Can the student perform the essential elements of a job with reasonable accommodations?
- Are these accommodations likely to place undue hardship on the employer?

It should be noted that many parts of a job or career may not be essential to that career. For example, a written test may not be essential to performing a job or career that is essentially “hands-on.” Conversely, a physical requirement (e.g., lifting files) may not be essential to a job or career that involves thinking or problem solving.

### ***C. Defining Success for Students with Disabilities in CTE***

Success for students with disabilities is determined by completion of the competencies that the IEP team determines the student must complete. Longer-term, success is determined by the student’s attaining a job or moving on to postsecondary education or both. In order to determine whether a student can succeed in a career-technical education program, a number of questions should be explored with the student’s IEP team.

#### **1. Questions that need to be asked by Career-Technical Educators**

- ✓ What support needs qualified the student for Special Education services?
- ✓ How often will supports need to be provided – hourly, daily, or weekly?
- ✓ How intense are support needs—one-to-one, small group, after class?
- ✓ How does this disability affect the student’s:
  - Academic performance (reading, writing, calculation)?
  - Behavioral performance (defiant, respect for others, noncompliant)?
  - Functional performance (following directions, communication)?
- ✓ What student interest/aptitude measure was used to match the student to the career-technical course?
- ✓ What related services will be available to assist the student in order to make progress in the class and to, therefore, receive a free and appropriate education?
- ✓ What documentation would you advise that I keep and how often should I keep it so that it will be helpful in our next meeting and to assure FAPE?
- ✓ When is the next IEP meeting scheduled to "review" the progress?

### ***D. Identifying Needed Supports for Students with Disabilities***

The types of supports that can benefit students with disabilities are too numerous to cover in this manual. A popular site to find supports for employees with disabilities is the Job Accommodation Network (JAN) which can be found at <http://www.jan.wvu.edu>.

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This site catalogues the many accommodations and resources that have been used for persons with disabilities at employment sites across the country. Additionally, the CTE Project has developed a site that catalogues accommodations and resources that have been used for students with disabilities at career and technical education programs. This site can be found at [www.cteproject.com](http://www.cteproject.com).

**GROUP EXERCISE FOR MODULE 4:** As a group, identify a career and technical education program and a type of student with a disability and discuss: (a) how the career and technical education program might benefit the student, (b) what competencies the student might expect to achieve, and (c) whether these competencies could be reasonably expected to lead to further career and technical education courses within the program, postschool employment, or postsecondary education. Identify some transition supports or services that might be helpful in promoting student success in employment, postsecondary education, or independent living.

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## RESOURCES

### A. WEB- BASED RESOURCES

#### FACULTY GUIDEBOOK

<http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/teachtip.htm>

#### CTE STANDARDS FROM STARK COUNTY

[http://www.starkcountytechprep.org/TP\\_files/profiles/profcurr\\_teaching.pdf](http://www.starkcountytechprep.org/TP_files/profiles/profcurr_teaching.pdf)

#### INSTRUCTIONAL STRATEGIES ON LINE

<http://olc.spsd.sk.ca/DE/PD/instr/index.html>

#### CONTENT ENHANCEMENT GIST

<http://courses.stratopedia.org/course/view.php?id=19>

#### STRATEGIES FOR DIFFERENTIATION

<http://www.wilmette39.org/DI39/distrategies.html>

#### SERVICE LEARNING

<http://www.civicenterprises.net/pdfs/service-learning.pdf>

#### UNIVERSAL DESIGN

[http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/16/e9/bd.pdf](http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/e9/bd.pdf)

#### OHIO CAREER-TECH HOME PAGE

<http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDetail.aspx?page=3&TopicRelationID=2&ContentID=14828&Content=69340>

#### CENTER FOR INNOVATION IN TRANSITION AND EMPLOYMENT

<http://www1.kent.edu/outreach/CentersInstitutes/InnovationTransitionEmployment.cfm>

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Tomlinson, Carol A. (2005). *How to differentiate instruction in mixed-ability classrooms*, 2nd ed. Pearson: New Jersey: